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ABSTRACT

The instructor's guide is coordinated for use with the student guide. The guide includes suggestions for teacher preparation, equipment and supply needs, suggested references, available audiovisual materials, open-ended questions for classroom discussion, educational opportunities for students, and a form for student evaluation of the study guide. The teacher may use the study guide as a basis for group study, practical application, or individualized instruction. The teacher is responsible for directing the study and learning program of the student; however, the teacher's role should be that of consultant after the student has exhausted his own means of completing a lesson, project, or activity. (MW)

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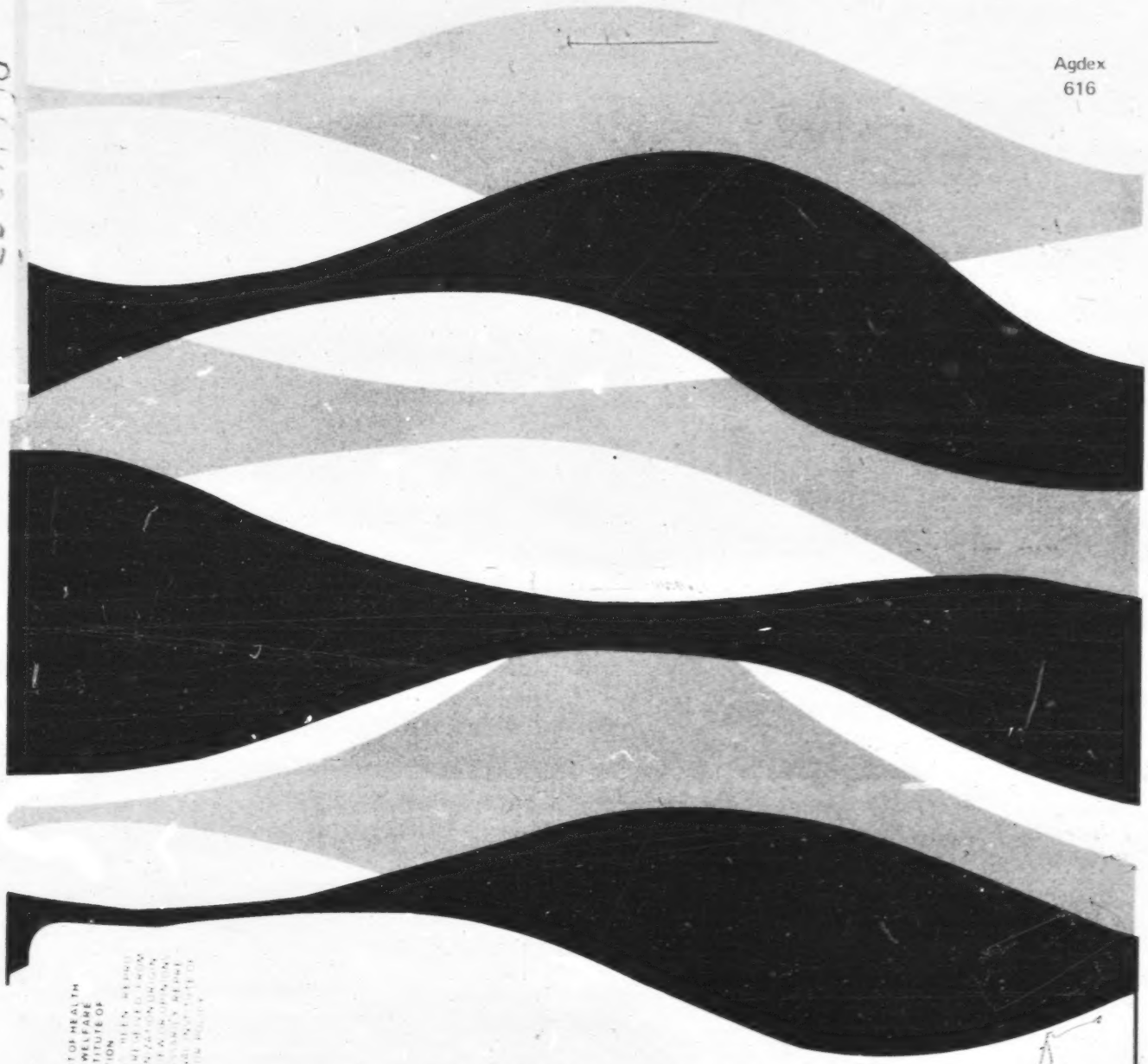

APICULTURE

Instructor's Guide

CURRICULUM MATERIALS FOR AGRICULTURAL EDUCATION

Agricultural Education, Division of Vocational Technical Education, College of Education, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061

In Cooperation With

Agricultural Education Service, Division of Vocational Education, State Department of Education, Richmond, Virginia 23216

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U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

CE 002 331

INDIVIDUALIZED STUDY GUIDE

ON APICULTURE

Curriculum Materials
for
Agricultural Education

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1974

FOREWARD

The Individualized Study Guide on Apiculture is prepared for students at all grade levels of a vocational education program in agriculture education. The material is presented in such a manner as to develop an understanding of honey bees and apiary operations. By performing learning activities and completing projects, the student is afforded a means of applying the knowledge he has learned.

The teacher may use the study guide as a basis for group study, practical application, or individualized instruction. The teacher is responsible for directing the study and learning program of the student; however, the student should be the self-motivator to accomplish the activities and projects.

The Individualized Study Guide on Apiculture assists the student of agricultural education to solve the problems which a beekeeper may encounter whether the apiary be a hobby or commercial operation.

ACKNOWLEDGEMENTS

Appreciation is expressed to Julian M. Campbell, State Supervisor of Agricultural Education, State Department of Education, Richmond, Virginia for sponsoring this study guide. Thanks are also extended to James E. Roberts, Extension Specialists, Entomology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia for providing technical assistance.

A very special thank-you is extended to Homer Powers, State Apiarist, Richmond, Virginia for the many suggestions he made concerning the technical accuracy of this publication. Mr. Powers has spent much of his own time reading and offering improvements in the correctness of this publication.

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Introduction to the Individualized Study Guide on Apiculture

This study guide contains introductory level information, principles, and management practices which may be applied by a hobbyist or a commercial apiary.

The lessons in this guide are designed to train students for entry level jobs, to establish students in a beekeeping enterprise, and to emphasize the importance of honey bees in our daily lives. Understanding the information in this study guide will help the student to understand the role of the honey bee in agricultural production, and how dependent man has become upon the honey bee.

Teaching Objective

The major teaching objective is to develop an interest on the part of the student to raise and to manage honey bees. The study guide should supplement community resources, on-the-job training, and provide the student with performance objectives during classroom instruction.

Teachers

First, teachers should read the introduction to the Individualized Study Guide on Apiculture.

Secondly, teachers should read the lessons included in the study guide, and add information, projects, or activities as they deem necessary.

Suggestions for Using the Study Guide

1. The teacher may substitute this study guide into the curriculum of a particular student, who has an interest in beekeeping, in lieu of the area being taught at that time.

2. The teacher may assist the student to develop a schedule for performing the learning or training activities.

3. The teacher should direct the student to perform some of the activities in a particular situation which will benefit the student; for example, at home, in the shop, in the apiary, or at the county agent's office.

4. The teacher should obtain the references, arrange to utilize community resources, or capitalize on individual experiences as may produce the learning experiences he plans for the student.

5. The teacher should encourage the student to become self-motivated and self-directing in the use of this study guide.

6. The teacher must use his professional judgment in supervising the students' activities. However, use of this study guide requires a minimum of aid and supervision on the part of the teacher.

7. The teacher, in certain cases, may desire to select particular lessons for a student to complete. Selection of lessons on an individual basis is recommended when the student has an urgent need to know about a practical situation which faces him in his occupational experience program.

Procedure

The teacher plays an important role in the usage of this study guide; however, the guide is written so that the student independently pursues the learning activities. The role of the teacher should be to serve as a consultant after the student has exhausted his own means of completing a lesson, project, or activity.

This study guide allows the student to work independently. The material has been kept in small lessons and presented simply to allow the student to understand the information. However, students should be encouraged to complete one lesson at a time to achieve the maximum outcome from completing the student guide.

The lessons of this study guide are designed with learning activities which allow the student to check his own progress, not as a graded exercise.

The lessons are developed around an activity sheet, information sheet, project sheet, glossary, references for the lesson, quiz, and answer sheet.

Activity Sheet

The Activity Sheet provides the direction for the student's study of the topic for each lesson. The Activity Sheet is planned to aid the student's understanding of the material.

Information Sheet

The Information Sheet contains the very basic information which is believed to be essential for the student to achieve success in completing the lessons.

An attempt has been made to present the information in a simple, easy to read, form.

The teacher should encourage the student to read additional literature listed in the reference section of each lesson, and to encourage the student to obtain the most up-to-date information on beekeeping.

Project Sheet

The Project Sheet is intended to be a "learn by doing" exercise which incorporates life experiences, skills, and public relations into learning activities.

Glossary and References for the Lesson

The Glossary and References for the Lesson have been included to supplement the information presented in the study guide, and to aid the student to understand the material.

Quiz and Answer Sheet

The Quiz and Answer Sheet for each lesson enables the student to measure his progress toward achieving the objectives for each lesson.

Students

The study guide was prepared to aid the student to understand the natural functions of honey bees. It is important for the student to use the study guide as intended, and to learn as much about honey bees as one needs to know to be successful as a beekeeper, farmer, or citizen.

The student should read the objectives for each lesson before starting to work. The objectives are presented on the Activity Sheet to give the student an idea of what to expect in the lesson.

When the student completes a lesson, he should check with his instructor. The instructor may desire to question the student about his mastery of the information and objectives of the lesson.

Composition of Lessons in the Individualized Instructional Booklet

1. Activity Sheet-films, class presentations by the student, and other in-school learning activities.

2. Information Sheet-applicable, detailed instructions for the student.

3. Project Sheet-outside school activities and skills which incorporate instruction and apiary business activity.

4. Glossary-list of terms for each lesson.

5. Reference Sheet-list of references for a given lesson.

6. Quiz- short, objective type.

7. Answer Sheet -answers to activity sheet as appropriate, and the quiz.

Suggestions for Teacher Preparation

LESSON I

THE HONEY BEE AND HER PRODUCTS

1. Obtain the visual aids needed for this study of apiculture.
2. Use Project 4, Observation Beehive, for a FFA Chapter project.
3. Demonstrate to students using this individualized study guide the use of film loop and movie projectors.

LESSON II

COLONY ORGANIZATION

1. Coordinate with a local beekeeper to arrange for students to use his apiary as a learning laboratory.
2. Provide the student with a display of honey bees entitled, "Life History of Honey Bee," Fort Atkinson, Wisconsin: National Agricultural Supply Company.
3. Encourage the student to write a news article for promotion of vocational education and FFA activities.

LESSON III

HOUSING AND EQUIPMENT

1. Provide a complete beginner's outfit for beekeeping for students to use.
2. May purchase beginner's outfit from any of numerous Bee Supply Companies.

LESSON IV

SELECTING AND OBTAINING BEES

1. Inform the student which beekeeper in the community may allow a visit.
2. Allow the student to make arrangements for the visit.

LESSON V

LOCATION OF THE APIARY

1. Need an apiary available for student usage.
2. Consult school policy regarding after school activities for students.
3. Coordinate student transportation needs to complete the projects.

LESSON VI

SEASONAL MANAGEMENT

1. Have the student provide the pail for constructing a friction top pail feeder.

LESSON VII

MANAGEMENT OF THE HIVE

1. Order a queen bee and have her on hand for introduction into the school's observation beehive; or,
2. Arrange with a local beekeeper to have a queen bee ordered for the replacement of another queen.
3. Insure that the student observes the introduction of the queen into a hive.

LESSON VIII

DISEASES, PESTS, PARASITES, AND PESTICIDES

1. Arrange for the student to visit an apiary to complete the learning activities.
2. Arrange transportation requirements for the student to travel to and from the apiary.

LESSON IX

PRODUCING, HARVESTING, AND MARKETING HONEY

1. Assist the student as needed to package and to market his honey product.

2. Explain the use of a double boiler to the student.

LESSON X

LAWS AND REGULATIONS

1. May desire to arrange a class field trip to allow the student to accomplish the projects for this lesson.

2. Be available to the student for consultation and to assist the student to understand the information sheet.

Equipment and Supplies Needed for Apiculture

ITEM	QUANTITY	ESTIMATED COST
Beginner's outfit consisting of:	1 each	$25.00
Hive, telescoping, metal 10-frame size, complete with frames.		
Sheets wired heavy brook foundation.	10	
Smoker.	1	
Bee veil.	1	
Hive tool, 10-inch.	1	
Boardman feeder.	1	
Pair bee gloves.	1	
Brush, bristle bee	1 each	.60
Cage, queen bee, shipping-borrow from a beekeeper	1 each	------
Embedder, Spur wire	1 each	.65
* Foundation comb-sheets to produce comb honey	1 lb.	2.00
War, kill, insect-borrow from school biology dept.	1 each	------
Knife, capping	1 each	2.00
Net, insect collecting-borrow from school biology dept.	1 each	------
Sugar, granulated with storage contr.	10 lbs.	1.40
* Super, 10-frame with frame	1 each	11.00
Wire, No. 28 gauge steel	½ lb.	.70
** Bee, package with a queen	3 lbs.	25.00
	TOTAL	$170.35

* Foundation comb must be ordered to fit the type super which is used.

** Package bees should be ordered for observation beehive or when an apiary is not available to students.

Suggested References

Amos, J. M. Beekeeping in Virginia, Publication 372, Blacksburg, Va. 24061. Virginia Polytechnic Institute and State University, Extension Division, January, 1970.

Beekeeping, Circular 326, (revised), Prepared by Gordon Bames and L. O. Warren, Fayetteville, Ark.: University of Arkansas, Agricultural Extension Service, 1966.

Beekeeping in Maryland, Extension Bulletin 223, Prepared by Alfred Dietz and Dewey M. Caron, College Park, Md.: University of Maryland, Cooperative Extension Service, 1971.

Brett, Charles H. and Sullivan, M. J., Bee Attraction to Cucurbit Flowers and Pollination. Bulletin 443, Raleigh, N. C.: North Carolina State University at Raleigh, July 1972.

Citrus Pollination by Honey Bees, Folder 87, Tucson, Arizona: University of Arizona, Agricultural Experiment Station and Cooperative Extension Service, April 1970.

Clarke, W. W. Jr. Correspondence Courses in Agriculture, Course 70, Beekeeping. University Park, Pa. 16802: Pennsylvania State University, College of Agriculture Extension Service.

Clarke, W. W. Jr. Pennsylvania Beekeeping, Circular 544, University Park, Pa. 16802: Pennsylvania State University, College of Agriculture Extension Service, 1971.

Gillespie, William H. and Dick, Oscar M. Jr. Beekeeping in West Virginia, Bulletin 33, Charleston, W. Va. 25305: West Virginia Department of Agriculture, 1966.

Legal Principles for Farm Managers - A Teacher's Unit Plan, Teacher Education Series, Vol. 9, No. 5-t, University Park, Pa.: The Pennsylvania State University, 1968.

Melons and Cucumbers Need Bees, Folder 90, Tucson, Arizona: University of Arizona, Agricultural Experiment Station and Cooperative Extension Service, April 1970.

Pennsylvania Beekeeping, Circular 544, University Park, Pa.: The Pennsylvania State University, College of Agriculture, Extension Service.

Root, A. I., The Story of Pollination. Medina, Ohio: The A. I. Roat Company, undated.

Super Market, 1971 Catalog, Bee Supply, Clarkson, Kentucky 42726: The Walter T. Kelley Co.

Townsend, G. F. Preparation of Honey for Market. Publication 544. Ontario Department of Agriculture: Toronto, Ontario, Canada. July 1961.

U. S. Department of Agriculture. Agricultural Stabilization and Conservation Service Regulation for Loan Program for Honey Price Support Program with amendments, dated April 8, 1970.

U. S. Department of Agriculture. Beekeeping in the United States, Agriculture Handbook No. 335, Washington, D.C.: Government Printing Office, August 1967, pp. 10-16, 56-64, 77-85.

U. S. Department of Agriculture. Care and Handling of Honey. Agricultural Research Service, April 1959.

U. S. Department of Agriculture. Composition of American Honey, Technical Bulletin 1261.

U. S. Department of Agriculture. Permanent Glass Color Standards for Extracted Honey. Eastern Regional Research Laboratory, Philadelphia, Pennsylvania, May 1951.

U. S. Department of Agriculture. Selecting and Operating Beekeeping Equipment, Farmer Bulletin 2204, Washington, D.C.: Government Printing Office.

U. S. Department of Agriculture. The Thermology of Wintering Honey Bee Colonies, Technical Bulletin, No. 1429. Washington D.C.,: Government Printing Office, November 1971.

U. S. Department of Agriculture. Using Honey Bees to Pollinate Crops, Leaflet No. 549, Washington, D. C. Government Printing Office, 1969.

Virginia Apiary Law as amended 1972. Charlottesville, Va.: Virginia Department of Agriculture and Commerce, 1972.

White, Jonathan W., Jr. Coarse Granulation of Honey. Eastern Regional Research Laboratory, Reproduced from Gleanings in Bee Culture, Philadelphia, Pa.

Whitehead, S. B. and Shaw, Frank R. Honeybees and Their Management. New York, 1951, pp. 78--84, D. VanNostrand Company, Inc.

Books for Beginners:

ABC and XYZ of Bee Culture, A. I. Root Co , Medina, Ohio 44256
First Book of Bees, Franklin Watts, Inc., New York, New York
First Lessons in Beekeeping, C. P. Dadant, Dadant and Sons, Hamilton, Illinois 62341
Hive and the Honey Bee, Roy A. Dadant and Sons, Hamilton, Illinois 62341
How to Keep Bees and Sell Honey, Walter T. Kelly, Clarkson, Kentucky
Starting Right with Bees, A. I. Root Co., Medina, Ohio 44256

Bee Periodicals:

Bee World, Hill House, Chalfont St. Peter, Gerrards Cross, Bucks, England
Journal of Apicultural Research, Hill House, Chalfont St. Peter, Gerrards Cross, Bucks, England
Gleanings in Bee Culture, A. I. Root Co., Medina, Ohio 44256
The Bee Hive, A. I. Root Co., Medina, Ohio 44256
Shop Talk, A. I. Root Co., Medina, Ohio 44256
American Bee Journal, Hamilton, Ill. 62341
Canadian Bee Journal, Port Hope, Ontario, Canada
Beekeeping in Virginia, 1970, Publication 372, Va. Poly. Institute and State Univ., Blacksburg, Virginia 24061.

Available Audio-Visual Materials

Source: CCM School Materials, Inc.
New York: CCM Information Corporation, Subsidiary of Crowell, Collier, and Macmillan, Inc.
Science Materials Catalog, 1970.

"Bees-Pollen and Nector Dance," PZ-443-1, 1½ min, Super 8mm Film Loop, $13.50 - Photo. sp. viewing hive.

"Flower Pollination by Bees," PZ - 443 - 2, 4 min., Super 8mm Film Loop, $17.00.

Queen Bee Duel, PZ - 443 - 3, 2 min., Std. 8 mm Film, $15.00, queen bees emerging from cells and fight until one is dead.

Queen Bee Laying Eggs, PZ - 443 - 4, I½ min., std 8mm Film, $12.00.

Raising a Queen Bee, PZ - 443 - 5, 2 min., Std. 8mm Film $15.00.

Swarm of Bees, PZ - 443 - 6, 1 min., Std 8mm Film $12.00.

Note: The following two films are especially useful.

"Bee People" - 16 mm, 30 minute sound film. On loan through county extension agent. County agent will be able to secure the film from Dr. James Roberts, Extension Specialists, Entomology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

"World of Bees" - 16 mm, 30 minute sound film. On loan through county extension agent. County agent will be able to secure the film from Dr. James Roberts, Extension Specialists, Entomology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Open-ended Questions for the Teacher to Ask the Student

1. What happens to the egg of the honey bee after it is laid until the adult bee emerges?

2. What are the legal restrictions placed upon a beekeeper by the current laws of Virginia?

3. What are the factors a hobbyist beekeeper must consider when determining the selling price for his honey?

4. How and why does a honey bee sting?

5. Design a commercial beekeeping business which would provide a full-time job and sufficient income to support one adult male and his wife.

Educational Opportunity for Students

Delaware Valley College of Science and Agriculture, Doylestown, Pennsylvania, offers a short course on campus each summer for beekeepers. The students utilize the college beeyard and honey house. Beekeepers who attend the short course must be at least ten (10) years of age.

Virginia Bee Associations:

Mr. Dan Showalter,
Virginia State Beekeepers Association
Broadway
Virginia 22815

Mr. R. H. Womble, Director
746 Bellwood Road
Hampton, Virginia 23366

Mr. C. L. Burgess, President
Virginia Commerical Beekeepers Association
1900 Memorial Avenue
Lynchburg, Virginia 24501

Mr. J. A. Marks, President
Piedmont Beekeepers Association
107 Clark Street
Madison Heights, Virginia 24572

Mr. W. S. Smoot
Northern Virginia Beekeepers Association
6534 Sothoron Road
McLean, Va.

Mr. Robert Falconer, President
Richmond Beekeeper's Association
R. D. #1, Box 11A
Glen Allen, Virginia 23060

Bee Inspection:

Mr. H. P. Powers, State Apiarist
203 North Governor St.,
Richmond, Va. 23219

Mr. L. P. Arnold, State Apiary Inspector
Central Virginia Region
8500 Midlothian Pike
Richmond, Va. 23235

Mr. A. A. Blanks,
State Apiary Inspector
Western Virginia Region
Long Island, Va. 24569

Mr. Frank M. Fulgham,
State Apiary Inspector
Eastern Virginia Region
1800 Magruder Rd.
Smithfield, Va. 23430

Student Evaluation of the Study Guide

Student's Name_____Grade Level_____

School_____

No. Years Enrolled in Vocational Agriculture_____

Option in which enrolled_____

Instructions for completing this questionnaire:

The student should complete the study guide or do as much as possible and then answer the following questions. Some questions the student need only to check a response which is appropriate to the student; other questions the student has the opportunity to write a response.

QUESTIONNAIRE

In the opinion of this student:

1. The directions for using the booklet were

   _____easy to follow

   _____difficult to follow

2. The reading level of the study guide was

   _____too difficult

   _____about right

   _____too easy

3. The student completed the workbook in a total number of

   _____hours _____minutes

4. If the student did not complete the lessons on apiculture, how far did he get?

   _____lessons _____page number

5. Why did the student not complete the study guide?

6. What projects did the student complete?

7. Which projects should be removed from the study guide?

8. The self-tests were

_____related to the instructional material

_____not related to the instructional material

9. The self-tests were

_____too difficult

_____about right

_____too easy

10. The student's ratings on the quizzes or self-tests were:

1.	5.	9.
2.	6.	10.
3.	7.	
4.	8.	